

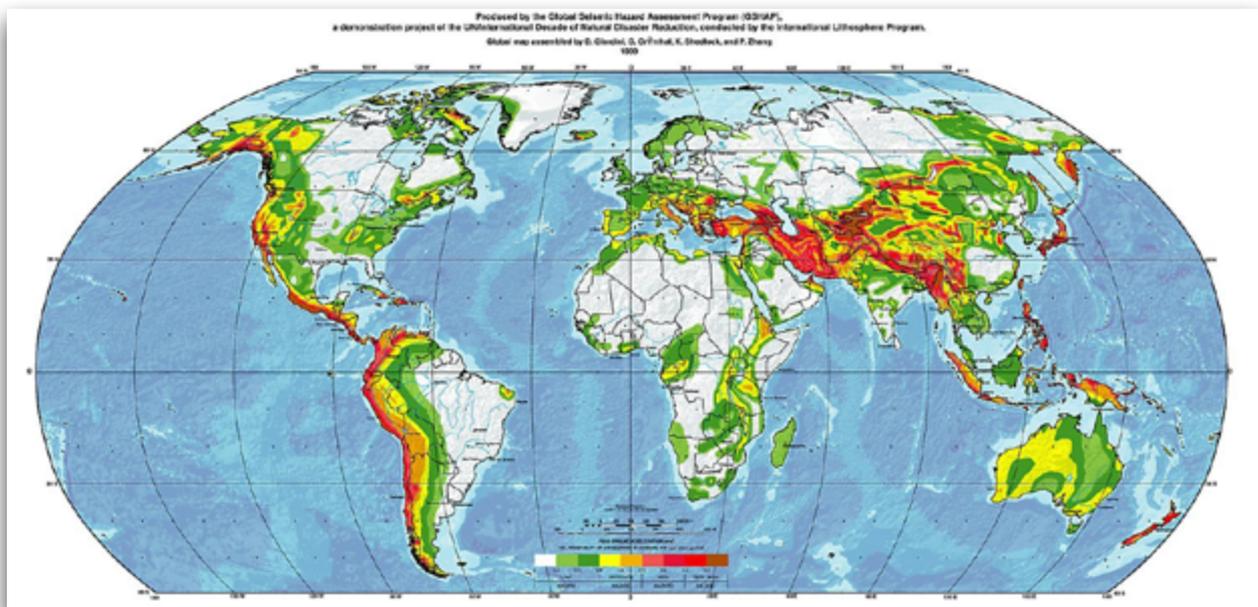
Earthquake Prediction

Is it possible?

Each year, more than 200,000 earthquakes are recorded globally, but lots more happen that aren't recorded.

Most earthquakes go undetected due to their small magnitude or because they occur in places which are not monitored. Scientists have been trying to predict and forecast earthquakes for over 100 years but they haven't yet figured out how to.

The concepts—Earthquake prediction, forecasting and warning



*Global seismic hazard map, showing in red where the highest risk of earthquakes is.
Image Credit: D. Giardini, G. Grynthal, K. Shedlock & P. Zhang.*

Earthquake prediction is a branch of the science of seismology. It is concerned with accurately predicting the time, location and magnitude of future earthquakes. In the 1970s, scientists were very optimistic about earthquake prediction. However, it is still not possible to make accurate predictions of when and where an earthquake will happen.

Earthquake forecasting is different from earthquake prediction. It focuses more on the general probability of earthquakes of different magnitudes happening and how often they are likely to happen, over long periods of time - years or decades! Usually, this is based on the knowledge of earth's tectonic plates and active fault lines, as well as how big, when, and where earthquakes have previously happened.



Earthquake warning, on the other hand, is something done upon a real earthquake strike. It provides a timely warning to people and areas that can be affected, in order to minimize the loss.

Why is earthquake prediction so difficult?

The Earth's crust is made from tectonic plates which collide, compress and spread all the time.

During these tectonic movements, stress or pressure continuously builds up until one day it suddenly releases. This is how most earthquakes happen. Because the way that the Earth's crust will behave when the tectonic plates move can vary so much, and because the properties and types of rocks making up the crust can be so different, it is very difficult to monitor, simulate and predict earthquakes!



Sometimes earthquakes originate deep beneath the ground or under the sea. This can add to the challenges for measuring them and collecting data.

When looking at earthquakes that have already occurred, there are some events have been identified as possible precursors; the thing happening might be a clue that an earthquake is about to happen. These events can include small quakes, increased level of the gas Radon, changes in the Earth's magnetic field, and sometimes even strange animal behaviours. Unfortunately none of these things have proven to be reliable ways to predict if a major earthquake is coming.

Lots of toads behaved very strangely before the 2008 Sichuan earthquake, China

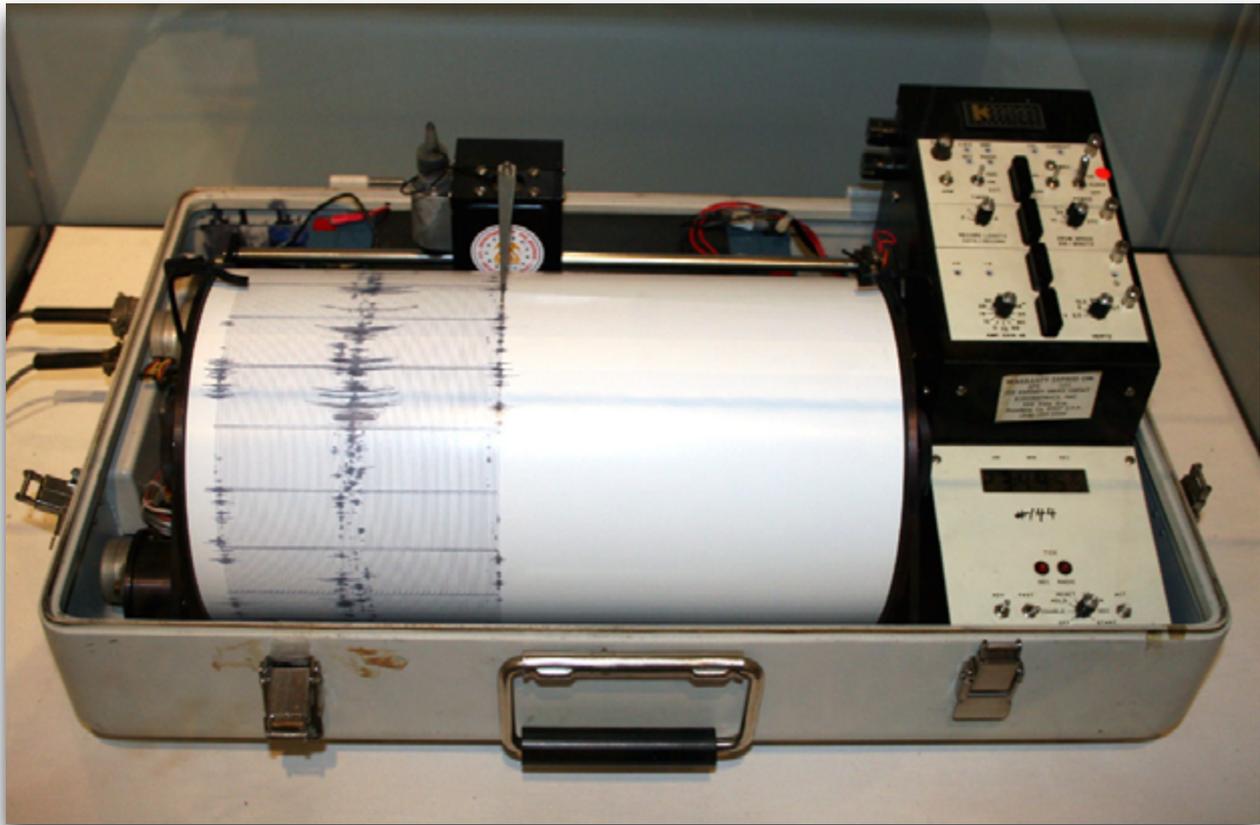
Image Credit: [Rachel Grant](#)

How are earthquakes monitored today?

The seismograph is the main earthquake monitoring instrument nowadays.

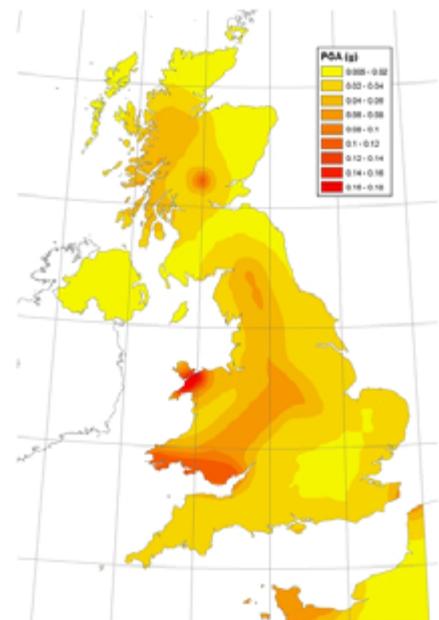
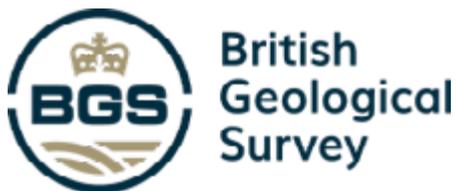
It can detect and measure earthquakes by converting vibrations in the Earth due to seismic waves into electrical signals. These signals are then displayed as seismograms on paper or a computer screen.

The seismographs in different places of the world form a network, which detects and measures worldwide earthquakes. Today, even our smartphones are capable of recording primary seismic waves!



*A seismograph is used to measure earthquakes.
Image Credit: Yamaguchi via Wikipedia*

In the UK, the BGS (British Geological Survey) Earthquake Seismology Team is the national earthquake monitoring agency. A network of sensors across the UK is operated to monitor earthquakes both in Britain and abroad. Data and information are provided to government, industry and the public. You can click on the BGS logo to learn more about earthquake seismology.



*An earthquake hazard map of the UK; red = higher risk
Image Credit: BGS*